

APPENDIX 5.1. DETAILED DATA FOR EQUIPMENT PRICE MARKUPS

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APPENDIX 5.1. DETAILED DATA FOR EQUIPMENT PRICE MARKUPS

5.1.1 INTRODUCTION

This appendix provides further details on the wholesaler, builder, and contractor markups presented in Chapter 5, *Markups for Equipment Price Determination*. For each markup type, the Department presents a breakdown of revenues and costs that were presented in Chapter 5 in an aggregated form. The Department scaled markups with direct “labor” costs and “all costs.” Only those expenses that scale with “all costs” are marked up when there is an incremental change in equipment costs.

5.1.2 DETAILED WHOLESALER DATA

Table 5.1.2.1 shows the complete breakdown of costs and expenses for wholesalers, as provided in the *1998 Wholesaler PROFIT Survey Report*.¹

Table 5.1.2.1 Disaggregated Costs and Expenses for Wholesalers

Item	Percent of Revenue	Scaling
Cost of Goods Sold	73.6%	Direct Input costs
Gross Margin	26.4%	
Payroll Expenses		
Executive Salaries & Bonuses	2.7%	Labor
Inside Sales Salaries/Wages	3.2%	Labor
Outside Sales Salaries/Commissions	2.2%	Labor
Warehouse & Delivery Salaries/Wages	2.3%	Labor
All Other Salaries/Wages & Bonuses	2.1%	Labor
Payroll Taxes	1.1%	Labor
Group Insurance	0.7%	Labor
Benefit Plans	0.5%	Labor
Total Payroll Expenses	14.8%	
Occupancy Expenses		
Utilities: Heat, Light, Power, Water	0.4%	Labor
Telephone	0.6%	Labor
Building Repairs & Maintenance	0.2%	Labor
Rent or Ownership in Real Estate	2.4%	Labor
Total Occupancy Expenses	3.6%	
Other Operating Expenses		
Advertising and Promotion	0.9%	All Costs
Insurance	0.4%	All Costs
Depreciation	0.7%	All Costs
Bad Debt Losses	0.3%	All Costs
All Other Operating Expenses	3.2%	All Costs
Total Other Operating Expenses	5.4%	
Operating Profit	2.7%	All Costs

5.1.3 DETAILED BUILDER DATA

Table 5.1.3.1 shows the complete breakdown of costs and expenses for builders, as provided by the U.S. Census Bureau.²

Table 5.1.3.1 Disaggregated Costs and Expenses for Builders

Item	Dollar Value	Percent of Revenue	Scaling
Cost of Equipment Sales			
Cost of materials, components, and supplies (Direct Materials and Equipment Installed)	\$41,052,528	27.64%	
Payroll, construction workers (Direct Labor)	\$7,739,858	5.21%	
Cost of construction work subcontracted out to others (Direct Subcontract)	\$53,996,600	36.35%	
Cost of selected power, fuels, and lubricants (Direct Other)	\$895,215	0.60%	
Total Cost of Equipment Sales	\$103,684,201	80.84%	
Gross Margin	\$44,846,923	30.19%	
Operating Expenses			
Payroll Expenses			
Fringe benefits, all employees (Payroll Taxes/Fringe Benefits)	\$2,623,197	1.77%	Labor
Payroll, other employees (Officer Salaries, Sales and Estimating Salaries, Administration Salaries, Warehouse Salaries)	\$7,224,726	4.86%	Labor
Occupancy Expenses			
Rental cost for machinery, equipment, and buildings + Purchased communication services (Occupancy Costs)	\$1,278,206	0.86%	Labor
Other Operating Expenses			
Depreciation charges during year (Depreciation)	\$871,329	0.59%	All Costs
Cost of repairs to buildings and other structures + Cost of repairs to machinery and equipment (Vehicle/Maintenance Repairs)	\$520,732	0.35%	All Costs
Total Operating Expenses	\$12,518,190	8.43%	
Net Profit Before Income Taxes	\$32,327,865	21.77%	

5.1.4 DETAILED CONTRACTOR DATA

Based on data in the 1995 edition of *Financial Analysis for the HVACR Contracting Industry*,³ Table 5.1.4.1 shows the complete breakdown of contractor costs and expenses.

Table 5.1.4.1 Disaggregated Costs and Expenses for Contractors

Item	Percentage	Scaling
Direct Materials	22.70%	
Equipment Installed	14.22%	
Direct Labor	19.01%	
Direct Subcontract	5.55%	
Direct Other	3.97%	
Total Cost of Sales	65.45%	
Gross Margin	34.55%	
Operating Expenses		
Advertising	1.10%	All Costs
Bad Debts	0.16%	All Costs
Depreciation	1.02%	All Costs
Interest Expenses	0.33%	All Costs
Liability Insurance	1.12%	All Costs
Other Insurance	1.36%	All Costs
Occupancy Costs	1.24%	Labor
Payroll Taxes/Fringe Benefits	4.02%	Labor
Selling Expense	1.49%	All Costs
Officer Salaries	3.80%	Labor
Sales and Estimating Salaries	2.69%	Labor
Administration Salaries	3.18%	Labor
Warehouse Salaries	0.46%	Labor
Unapplied Labor	1.04%	Labor
Vehicle/Maintenance Repairs	1.82%	All Costs
Other Operating Expenses	5.13%	All Costs
Total Operating Expenses	29.96%	
Net Operating Profit	4.59%	All Costs
Other Income	0.79%	All Costs
Other Expenses	-0.49%	All Costs
Net Profit Before Income Taxes	4.89%	

5.1.5 ESTIMATION OF MARKUP STANDARD DEVIATIONS

The Department used U.S. Census survey data to estimate furnace wholesaler,¹ builder, and contractor² markup distributions. The survey data included state-level heating, ventilating, and air-conditioning (HVAC) total value of work, number of firms, cost of goods sold, cost of subcontract work, cost of materials, and construction payroll. The Department used these data to calculate individual state baseline markups. The Department did not calculate markups for some small states because the Census Bureau withheld data for those states. The Department did not calculate the builder markup for Nevada because the data for that state are skewed for reasons that are not clear.

Markups may vary across states for several reasons, including differences in firm size. For example, the average North Dakota wholesale firm sells \$938,000 in goods and services annually and has a 1.85 baseline markup. The average Oregon wholesale firm sells \$7,156,000 and has a 1.23 baseline markup (See Tables 5.1.5.1-5.1.5.3).

The Department estimated the size of the baseline markup distribution from the standard deviation of across-state markups. The wholesale markup standard deviation is 0.11, the builder markup standard deviation is 0.07, and the contractor markup standard deviation is 0.04. These standard deviations suggest that wholesale markups vary more than builder or contractor markups, a result that seems reasonable because there are fewer firms, and thus less competition, at the wholesale level than at the builder or contractor distribution levels. The Department assumed that new construction and replacement market contractor markups have the same relative standard deviation as that developed from the baseline markups for all contractors.

The Department defined the term relative standard deviation as the actual standard deviation divided by the baseline markup. The wholesale relative standard deviation is 8.2 percent of its baseline markup, the builder relative standard deviation is 5.0 percent, and the contractor relative standard deviation is 3.1 percent. The Department also assumed that wholesale, builder, and contractor incremental markups have the same relative standard deviation as wholesale, builder, and contractor baseline markups. The Department used this assumption to calculate the standard deviation of wholesale, builder, and contractor incremental markups.

Table 5.1.5.1 Wholesale Baseline Markups by State

States with Available Data	Number of Firms	Total Sales (\$000)	Average Firm Sales (\$000)	Cost of Goods Sold (\$000)	Baseline Markup
Alabama	106	310,246	2,927	230,160	1.35
Arizona	70	281,826	4,026	216,368	1.30
Arkansas	51	109,982	2,157	83,093	1.32
California	325	1,037,453	3,192	688,575	1.51
Colorado	67	206,248	3,078	153,600	1.34
Connecticut	43	161,945	3,766	113,816	1.42
Florida	387	1,037,529	2,681	720,113	1.44
Georgia	179	577,898	3,228	426,361	1.36
Illinois	198	529,087	2,672	379,812	1.39
Indiana	113	391,395	3,464	288,678	1.36
Kentucky	84	227,761	2,711	167,535	1.36
Louisiana	118	272,837	2,312	202,058	1.35
Maryland	92	312,671	3,399	251,925	1.24
Michigan	159	526,458	3,311	402,887	1.31
Minnesota	62	260,501	4,202	175,585	1.48
Missouri	114	265,762	2,331	195,549	1.36
Montana	16	28,924	1,808	20,059	1.44
New Jersey	155	462,301	2,983	329,644	1.40
New York	217	578,251	2,665	419,642	1.38
North Caroline	201	683,453	3,400	465,177	1.47
North Dakota	6	5,625	938	3,038	1.85
Ohio	193	542,633	2,812	391,311	1.39
Oklahoma	80	198,092	2,476	147,117	1.35
Oregon	45	322,038	7,156	262,250	1.23
South Carolina	100	254,564	2,546	170,129	1.50
Tennessee	128	619,069	4,836	459,644	1.35
Texas	459	1,267,425	2,761	911,112	1.39
Virginia	122	407,048	3,336	304,818	1.34
Washington	87	273,753	3,147	183,174	1.49
Wisconsin	85	294,943	3,470	238,470	1.24
				Average Markup	1.39
				Standard Deviation	0.11

Table 5.1.5.2 Builder Baseline Markups by State

States with Available Data	Number Firms	Value of Construction (\$)	Average Firm Construction Value (\$)	Average Firm Cost of Goods Sold (\$)	Baseline Markup
Alabama	1,977	1,576,208	797	571	1.40
Alaska	429	359,555	838	577	1.45
Arizona	2,305	4,873,609	2,114	1,579	1.34
Arkansas	1,028	539,958	525	375	1.40
California	12,998	18,137,680	1,395	918	1.52
Colorado	3,026	4,069,277	1,345	970	1.39
Connecticut	1,800	1,427,401	793	563	1.41
Delaware	556	513,984	924	708	1.31
District of Columbia	54	45,717	847	692	1.22
Florida	6,739	12,119,566	1,798	1,298	1.39
Georgia	3,595	4,751,674	1,322	919	1.44
Idaho	1,123	669,998	597	421	1.42
Illinois	5,705	6,129,204	1,074	730	1.47
Indiana	3,769	3,485,518	925	662	1.40
Iowa	1,531	867,331	567	411	1.38
Kansas	1,373	1,389,289	1,012	746	1.36
Kentucky	1,733	1,749,468	1,010	719	1.40
Louisiana	1,287	892,787	694	516	1.34
Maine	956	451,089	472	346	1.37
Maryland	3,675	4,071,741	1,108	805	1.38
Massachusetts	2,840	2,466,962	869	605	1.44
Michigan	6,083	5,113,257	841	592	1.42
Minnesota	2,640	2,956,041	1,120	818	1.37
Mississippi	896	596,314	666	499	1.33
Missouri	3,204	2,542,704	794	569	1.40
Montana	959	378,113	394	290	1.36
Nebraska	919	785,134	854	575	1.48
Nevada	976	2,829,068	2,899	1,994	1.45
New Hampshire	831	638,611	768	547	1.41
New Jersey	4,615	4,393,306	952	643	1.48
New Mexico	1,343	1,071,559	798	618	1.29

States with Available Data	Number Firms	Value of Construction (\$)	Average Firm Construction Value (\$)	Average Firm Cost of Goods Sold (\$)	Baseline Markup
New York	6,842	4,573,915	669	475	1.41
North Carolina	5,455	5,981,232	1,096	774	1.42
North Dakota	285	111,833	392	293	1.34
Ohio	5,386	5,398,843	1,002	698	1.44
Oklahoma	878	756,881	862	608	1.42
Oregon	3,150	2,492,183	791	560	1.41
Pennsylvania	6,317	5,182,779	820	581	1.41
Rhode Island	610	332,595	545	321	1.70
South Carolina	2,436	2,300,149	944	693	1.36
South Dakota	438	250,323	572	431	1.33
Tennessee	2,588	2,686,121	1,038	754	1.38
Texas	5,142	10,069,998	1,958	1,398	1.40
Utah	1,662	1,360,194	818	566	1.45
Vermont	641	325,984	509	378	1.35
Virginia	4,881	5,129,615	1,051	763	1.38
Washington	5,660	4,149,635	733	514	1.43
West Virginia	1,504	440,210	293	219	1.34
Wisconsin	2,959	2,404,741	813	617	1.32
Wyoming	541	339,930	628	467	1.35
Average Markup					1.40
Standard Deviation					0.069

Table 5.1.5.3 Contractor Baseline Markups by State

State	Number of Firms	Total Value of Work (\$000)	Average Firm Size (\$000)	Cost of Subcontract Work (\$000)	Cost of Materials (\$000)	Construction Payroll (\$000)	Baseline Markup
Alabama	1,413	1,227,115	868	71,884	469,589	261,627	1.53
Alaska	187	191,222	1,023	26,999	62,114	39,063	1.49
Arizona	1,344	1,558,535	1,160	105,390	670,620	314,727	1.43
Arkansas	980	587,503	599	38,859	233,542	123,406	1.48
California	6,776	8,179,446	1,207	752,768	3,074,373	1,829,630	1.45
Colorado	1,654	1,693,660	1,024	163,179	681,129	360,281	1.41
Connecticut	1,254	1,004,514	801	92,352	363,915	211,448	1.50
Delaware	288	409,763	1,423	33,040	137,526	97,407	1.53
Florida	4,803	4,270,074	889	387,328	1,743,206	808,674	1.45
Georgia	2,589	2,707,372	1,046	226,200	1,068,051	509,764	1.50
Hawaii	243	262,209	1,079	31,120	84,395	53,728	1.55
Idaho	546	534,485	979	71,998	203,012	99,646	1.43
Illinois	3,756	4,666,573	1,242	421,160	1,612,309	1,111,017	1.48
Indiana	1,973	2,415,608	1,224	248,396	880,509	551,694	1.44
Iowa	938	941,814	1,004	90,092	333,338	201,583	1.51
Kansas	1,065	991,048	931	88,986	413,221	199,495	1.41
Kentucky	1,178	1,069,652	908	71,707	420,424	233,198	1.47
Louisiana	1,200	1,032,992	861	123,727	390,003	189,221	1.47
Maine	552	271,742	492	22,337	109,332	54,823	1.46
Maryland	2,037	2,706,074	1,328	431,681	996,255	518,575	1.39
Massachusetts	2,172	2,197,054	1,012	354,209	788,930	404,929	1.42
Michigan	3,187	3,345,829	1,050	386,971	1,168,701	704,768	1.48
Minnesota	1,416	1,744,406	1,232	185,449	645,039	376,324	1.45
Mississippi	746	561,720	753	37,622	246,454	104,011	1.45
Missouri	1,824	1,850,266	1,014	223,236	630,723	411,300	1.46
Montana	412	248,138	602	20,278	110,880	51,205	1.36
Nebraska	662	585,515	884	54,614	228,098	126,247	1.43
Nevada	515	881,622	1,712	70,133	355,908	194,926	1.42
New Hampshire	462	362,465	785	42,964	140,289	68,677	1.44
New Jersey	3,320	2,809,386	846	348,499	995,667	578,431	1.46
New Mexico	600	393,575	656	35,545	155,469	93,895	1.38
New York	5,234	5,292,794	1,011	665,391	1,887,074	1,012,489	1.48
North Carolina	3,057	2,989,371	978	238,119	1,184,341	608,150	1.47
North Dakota	248	225,388	909	20,210	84,540	52,237	1.44
Ohio	3,329	3,847,492	1,156	484,047	1,349,187	841,751	1.44
Oklahoma	1,156	737,958	638	59,705	291,994	134,307	1.52
Oregon	1,079	1,349,767	1,251	148,845	498,268	332,455	1.38
Pennsylvania	3,546	4,001,213	1,128	431,042	1,485,212	830,817	1.46
Rhode Island	356	240,887	677	36,581	91,233	43,832	1.40
South Carolina	1,351	1,189,389	880	109,630	484,566	262,120	1.39
South Dakota	311	171,663	552	15,506	71,723	34,206	1.41

State	Number of Firms	Total Value of Work (\$000)	Average Firm Size (\$000)	Cost of Subcontract Work (\$000)	Cost of Materials (\$000)	Construction Payroll (\$000)	Baseline Markup
Tennessee	1,612	1,940,866	1,204	187,255	815,782	380,309	1.40
Texas	5,516	5,988,883	1,086	571,356	2,482,127	1,147,065	1.43
Utah	835	899,015	1,077	114,587	313,840	173,567	1.49
Vermont	245	149,893	612	11,891	55,013	33,780	1.49
Virginia	2,391	2,109,902	882	143,031	863,964	475,238	1.42
Washington	1,746	1,894,359	1,085	134,056	693,627	417,457	1.52
West Virginia	496	307,942	621	15,757	138,747	66,039	1.40
Wisconsin	1,981	2,108,422	1,064	168,459	740,090	512,820	1.48
Wyoming	264	130,175	493	12,688	52,717	26,025	1.42
Average Markup							1.45
Standard Deviation							0.04

5.1.6 ESTIMATION OF FRACTION OF GAS FURNACE SHIPMENTS TO NEW CONSTRUCTION

The Department used data from the U.S. Department of Commerce and the Gas Appliance Manufacturers Association (GAMA) to estimate the fraction of gas furnace shipments that go to new housing (Table 5.1.6.1).^{4, 5} The data indicate that 51.2 percent of the housing completions in 1999 included gas furnaces. This estimate was based on the heating equipment shipped to new construction. Given the number of gas furnaces shipped in 1999, the Department concluded that 26.3 percent of all gas furnace shipments were installed in new housing.

Table 5.1.6.1 Fraction of Gas Furnace Shipments to New Construction

Number of housing completions in 1999, all structures	1,604,000
Share of gas furnaces in all heating equipment shipped to new construction	51.2%
Gas furnaces installed in new housing (assumed)	821,248
Number of gas furnace shipments in 1999	3,126,147
Percent of gas furnaces installed in new housing	26.3%

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